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EXAMINER	
DEJONG, ERIC S	
ART UNIT	PAPER NUMBER
1631	

MAIL DATE	DELIVERY MODE
12/23/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/500,006	SAITO, SEIJI	
	Examiner	Art Unit	
	ERIC S. DEJONG	1631	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *31 August 2007 and 21 December 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-16* is/are pending in the application.

4a) Of the above claim(s) *1,3,4,6,7,9,10 and 12* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *2,5,8,11 and 13-16* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED OFFICE ACTION

Applicants responses filed 08/31/2007 and 12/21/2007 is acknowledged.

Claims 1-16 are pending. Claims 1, 3, 4, 6, 7, 9, 10, and 12 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 02/07/2007. Claims 2, 5, 8, 11, and 13-16 are currently under examination.

Rejections and/or objections not reiterated from previous office actions are hereby withdrawn. The following rejections and/or objections are either reiterated or newly applied. They constitute the complete set presently being applied to the instant application.

Sequence Compliance

The objection to the specification for failing to comply with the requirements of CFR § 1.821 through 1.825 is withdrawn in view of applicants submissions filed on 12/21/2007.

Claim Rejections - 35 USC § 101

The previous rejection of claims 8 and 15 under 35 USC 101 because the claim is directed a computer program, per se, is withdrawn in view of amendments made to the instant claims.

35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 2, 5, 8, 11, and 13-16 rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

Claims 2, 5, 8, 11, and 13-16 are drawn to a method and the related apparatus, computer program, and computer readable medium for interaction site prediction. The process for interaction site prediction comprises the abstract process steps of an input step of primary sequence information on a target protein, an acquisition step of tertiary that acquires tertiary data of said target protein, a fragment structure program execution step, a prediction result comparison step, a frustration calculation step, and an interaction site prediction step and, therefore, involves the application of a judicial exception. Regarding inventions involving the application of a judicial exception, said application must be a practical application of the judicial exception that includes either a step of a physical transformation, or produces a useful, concrete, and tangible result. In the instant claims, there is no step of physical transformation that results from said application of judicial exception, thus the Examiner must determine if said application of a judicial exception produces a useful, concrete, and tangible result.

In determining if the application of a judicial exception produces a useful, concrete, and tangible result, the Examiner must determine each standard individually. For a result to be "useful," the application of a judicial exception must produce a result that is specific, and substantial. For a result to be "concrete," the application of a judicial exception must have a result that is reproducible. For a result to be "tangible," the application of a judicial exception must produce a real world result . Furthermore, the claim must be limited only to statutory embodiments.

Claims 2, 5, 8, 11, and 13-16 do not produce a tangible result. A tangible result requires that the claim must set forth a practical application of a judicial exception to produce a real-world result. This rejection could be overcome by amendment of the claims to recite that a result of the application of a judicial exception (the prediction of interaction sites) is further output to a display, a user, or otherwise effectively communicated to a practitioner. This rejection is maintained and reiterated from the previous Office action.

Claims 2, 5, 8, 11, and 13-16 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. The following grounds of rejection are newly applied.

The recent en banc decision regarding Bilski v. Warsaw (2008) set forth that a process is patent-eligible if (1) it is ties to a particular machine or apparatus or (2) it transforms a particular article into a different state or thing. a method and the related apparatus, computer program, and computer readable medium for interaction site

prediction. The recited process and that carried out by a program on computer readable media comprises the abstract/computational steps of an input step of primary sequence information on a target protein, an acquisition step of tertiary that acquires tertiary data of said target protein, a fragment structure program execution step, a prediction result comparison step, a frustration calculation step, and an interaction site prediction step. The instant claims do not recite or inherently involve any transformation of an article, therefore the Examiner must determine if the instant claims have a tie to a particular machine or apparatus. The recited process claims do not recite any limitation involving a particular machine or apparatus. Further, claims directed to an apparatus and computer readable media only recite systems and components of a general purpose computer and as such does not satisfy the requirement of a particular machine or apparatus, as its only function would preempt the abstract process as set forth above.

Response to Arguments

Applicant's arguments filed 08/31/2007 have been fully considered but they are not persuasive.

In regard to the rejection of claims under 35 USC 101 as being directed to non-statutory subject matter, applicants argue that the instant claims produce the tangible result of predicting an interaction site.

In response, applicants argument is not persuasive because a prediction of an interaction site is an abstract idea, per se. As such, the only result from practicing the claimed invention remains an unutilized, abstract idea.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 2, 5, 8, 11, and 13-16 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claims contain subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

In In re Wands (8 USPQ2d 1400 (CAFC 1988)) the CAFC considered the issue of enablement in molecular biology. The CAFC summarized eight factors to be considered in a determination of "undue experimentation." These factors include: (a) the quantity of experimentation necessary; (b) the amount of direction or guidance presented; (c) the presence or absence of working examples; (d) the nature of the invention; (e) the state of the prior art; (f) the relative skill of those in the art; (g) the predictability of the art; and (h) the breadth of the claims.

In considering the factors for the instant claims:

a) In order to use the claimed invention one of skill in the art must predict an interaction site in a target protein based on a calculation of frustration of a local part of the primary sequence information of said target protein. For the reasons discussed below, there would be an unpredictable amount of experimentation required to practice the claimed invention.

b) The disclosure teaches that primary sequence of a target protein is used by a plurality of fragment structure prediction to predict fragment structures of the target protein. The resulting predicted fragments structures are further compared to acquired tertiary data, a frustration calculation is performed for a local part of the primary sequence information of the target protein, and an interaction site is predicted based on said frustration calculation. The disclosure does not provide detailed guidance regarding how to accurately predict a "real world" protein or a fragment thereof from a calculation performed on a local part of the primary sequence information of a target protein.

c) The disclosure provides exemplary embodiments of using structure prediction programs to predict tertiary structure and comparing predicting tertiary structure to structures in a tertiary structure database. The disclosure does not provide any working example wherein a "real world" protein structure or fragment thereof was successfully predicted based on a calculation of frustration of a local part of the primary sequence information of said target protein.

d) The nature of the invention, prediction of protein tertiary structure from primary sequence information, is complex.

e) The prior art does not show that a tertiary structure of a protein or fragment thereof can be accurately or reliably predicted from primary sequence information.

Ginalksi et al. sets forth a summary and review of recent efforts to develop automated structure determination protocols and alternative models to assign folds using prediction algorithms (see Ginalksi et al., Abstract). Page 1874, col. 1, line 15 though coil 2, line 5 of Ginalski et al. states:

"Theoretically, it should be possible to deduce structure from sequence by accurate simulation of physical processes. We are very far from achieving this goal,-and the methods of practical importance were traditionally based on the observation that proteins with similar sequences are structurally similar as well."

Ginalski et al. further teaches that protein prediction methods are still in their infancy and are not yet capable of generating meaningful protein models (see Ginalksi et al., page 1875, col. 2, lines 22-35).

f) The skill of those in the art of protein tertiary structure prediction is high.

g) The predictability of protein tertiary structure from primary sequence information is unknown in the prior art.

h) The claims are broad in that they are drawn to predicting any interaction site in any target protein.

The skilled practitioner would first turn to the instant description for guidance in using the claimed invention. However, the disclosure lacks clear evidence that the structure of a protein or fragment thereof can be predicted from primary sequence information. As such, the skilled practitioner would turn to the prior art for such guidance, however the prior teaches the prediction of protein tertiary structure and predicted protein activity from primary sequence information is not known in the art. Finally, said practitioner would turn to trial and error experimentation to determine a real world target protein actually have or maintain an active site derived from a predicted tertiary structure of a protein or fragment thereof. Such amounts to undue experimentation.

Response to Arguments

Applicant's arguments filed 08/31/2007 have been fully considered but they are not persuasive.

Applicants argue that the disclosure provides evidence that the structure of a protein fragment can be predicted from primary sequence information. Applicants further cite as support Furuta et al., Simons et al., and Bystroff et al. as support.

In response, the basis of the instant rejection is not that protein fragment structure cannot be predicted from primary sequence information, but rather that such computationally predicted structures are taught in the art as being unreliable. Thus, the instant claims fail the use prong of 35 USC 112, first paragraph, which requires that the supporting disclosure be sufficient to enable one of skill in the art to make and use the claimed invention. Further, the prior art of Furuta et al., Simons et al., and Bystroff et al. does not specifically address or resolve the deficiencies in predicted protein structures based on primary sequence information as taught by Ginalski et al. Therefore applicants argument is not persuasive.

Applicants further argue that the fact experimentation may be complex does not make it undue, if the art typically engages in such experimentation.

In response, applicants argument is not persuasive because the basis of the instant rejection is not that the additional experimentation is complex. Rather, the basis of the instant rejection established that one of skill in the art must resort to trial and error experimentation in order to determine which, if any, of the predicted protein structures

actually have or maintain in the real world an active site derived from a predicted tertiary structure of a protein or fragment thereof. Therefore, it is maintained that the instant claims lack enablement under 35 USC 112, first paragraph.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ERIC S. DEJONG whose telephone number is (571)272-6099. The examiner can normally be reached on 8:30AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marjorie Moran can be reached on (571) 272-0720. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Eric S DeJong/
Examiner, Art Unit 1631